DOCUMENT RESUME

ED 316 349 PS 018 649

AUTHOR Manning, Brenda H.; White, C. Stephen
TITLE Comparisons of Young Children's Private Speech Profiles: Analogical Versus Nonanalogical Reasoners.
PUB DATE Mar 90
NOTE 30p.; A portion of this paper was presented at the Conference on Human Development (Richmond, VA, March 1990).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Classroom Research; *Cognitive Processes; Comparative Analysis; *Kindergarten Children; *Metacognition; Primary Education; *Research Methodology; Social Behavior; Student Behavior; *Student Characteristics
IDENTIFIERS *Analogical Reasoning; Internality Externality; *Private Speech

ABSTRACT

The primary intention of this study was to compare private speech profiles of young children classified as analogical reasoners (AR) with young children classified as nonanalogical reasoners (NAR). The secondary purpose was to investigate Berk's (1986) research methodology and categorical scheme for the collection and coding of private speech utterances of kindergarten children. Subjects were six children (3 AR and 3 NAR) in a public school kindergarten. ARs were identified by their superior performance on the Test of Analogical Reasoning in Children. In the first private speech context, 20 spontaneous self-talk utterances were collected during independent school tasks in which no help was given by teachers. In the second private speech context, private speech was prompted by the teacher during an analogical reasoning test. In both contexts, AR children used a higher level of self-verbalizations. In the first context, AR children used 70 percent of the highest level of private speech, while NAR children used 15 percent of the highest level. In the second context, AR children used 36 references to higher order relations, while NAR children used 10 references. AR children exhibited greater internality scores and were rated by teachers as more socially and behaviorally acceptable in their classroom conduct. (RH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED316349

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Comparisons of Young Children's Private Speech Profiles: Analogical Versus Nonanalogical Reasoners

Brenda H. Manning
Associate Professor

C. Stephen White
Assistant Professor

University of Georgia
427 Aderhold Hall
College of Education
Athens, Georgia 30602
(404) 542-4244

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Brenda H. Manning
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PS 018649

Runninghead: PRIVATE SPEECH

A portion of this paper was presented at the Conference on Human Development, March 1990, Richmond, VA.

BEST COPY AVAILABLE

Abstract

The intent of the current study was to compare the private speech profiles of young school children who were classified as analogical reasoners (AR) with children classified as nonanalogical reasoners (NAR). Six children (3 AR and 3 NAR) enrolled in a public school kindergarten were subjects. In the first private speech context (I) twenty spontaneous self-talk utterances were collected during independent school tasks (without teacher help). In the second private speech context (II) private speech was prompted by the teacher during an analogical reasoning test (TARC). In both contexts the AR used a higher level of self-verbalizations. The AR used 70% of the highest level of private speech; whereas, the NAR used 15% of the highest level during Context I. AR used 36 references while NAR used 10 references to higher order relations in Context II. For corroborative data the AR exhibited more internality scores and were rated by their teachers as more socially-behaviorally acceptable in their classroom conduct. These findings provide additional information which can be used to evaluate and study alternative methods to examine young children's cognitive and metacognitive abilities.

Comparisons of Young Children's Private Speech Profiles: Analogical Versus Nonanalogical Reasoners

The intent of the current study was to compare the private speech profiles of young school children who were classified as analogical reasoners (AR) with children classified as nonanalogical reasoners (NAR). In addition, the corroborative role of social-behavioral ratings was investigated within the context of cognitive and metacognitive performances of the children.

Rationale for the Cognitive Context

Analogical reasoning is an important cognitive process that can be considered essential to human learning. In teaching and learning contexts, analogies are instructional tools used by teachers and learners to make novel or complex information comprehensible by relating it to information that is more familiar and simpler (Davidson, 1976). In order for younger or inexperienced learners to understand and process information that is given to them, they must interpret the ideas and relate them to their own knowledge and experience.

The pervasiveness of reasoning by analogy has been recognized by research which has focused on the nature (Mulholland, Pellegrino, & Glaser, 1980; Sternberg, 1977), development (Holyoak, Junn, & Billman, 1984; Sternberg & Rifkin, 1979) and training (Alexander, White, & Mangano, 1983; Alexander, Wilson, et al., 1987; Sternberg, Ketron, & Powell, 1982) of analogical reasoning abilities. Recent research has demonstrated that preschool children can and do solve analogy problems (Alexander, Willson, White, & Fuqua, 1987; Brown, Kane, & Echols, 1986; Crisafi & Brown, 1986) and

that young children who do not do so spontaneously can be trained to reason analogically (Alexander, Wilson, et al., 1987; White & Alexander, 1986; White & Caropreso, 1989). These researchers have shown that when provided with an appropriate and motivating task, young children were successful at solving analogy problems (Alexander, Willson, et al., 1989; Brown, Kane, & Echols, 1986).

The research which has examined young children's performance of analogy problems has been most concerned with the question of whether young children do or do not reason analogically. These studies have focused primarily on cognitive capabilities rather than on the factors which may contribute to successful problem solving in varying contexts. For example, the relationship between geometric analogy reasoning, a cognitive task, and tasks which are primarily metacognitive has not been explored. In this investigation we wanted to determine any relationships that may exist between cognitive performance during a specific problem solving activity and metacognitive performance on typical school tasks. We chose to analyze the private speech of kindergartners during independent work as means of establishing any potential relationships.

Rationale for the Metacognitive Context

Private speech is audible speech spoken-to-self that is not intended for others (Berk & Garvin, 1984). Instead it is spoken by oneself for self-communication and/or self-guidance. This definition is derived from the Soviet psychologist Vygotsky (1934/1987; 1978) who hypothesized that private speech is a product of socialized language between adult and child. In other words the communication of adults used to direct their children becomes the communication reservoir from which children draw their verbal abilities to

plan, guide, and regulate their own behavior. Vygotsky's position is unlike Piaget's belief that private speech indicates an inability to assume the role of others and does not advance cognitive development. Vygotsky viewed private speech as instrumental in the development of introspective cognitive planning; while, Piaget viewed private speech as an egocentric characteristic that declines as children develop introspective cognitive thought.

The research efforts of many, including Berk (1986) and others (Frauenglass & Diaz, 1985; Kohlberg, Yaeger, & Hjertholm, 1968) indicate empirical support for Vygotsky's position on the cognitive role of private speech. Their works indicate that private speech develops in a predictable fashion from self-stimulating task irrelevant private speech to task relevant external manifestations of inner speech (Berk, 1986). Modification of these categories provided a structure for testing the private speech utterances of AR versus NAR. It was hypothesized that those children who were able to reason analogically were more cognitively advanced and therefore would use a more advanced level of private speech. In addition the bidirectionally of private speech and analogical reasoning ability and was noted in this investigation. It was impossible to determine if the private speech led the analogical reasoning ability or visa versa.

A salient characteristic of this study was the collection of private speech utterances of kindergarten children during a typical school task that was challenging and demanding. There is evidence (Berk, 1986; Dickie, 1973; Goodman, 1981; Kohlberg et al., 1968; Manning, 1988/in press; Zivin, 1972) that audible private speech increases when individuals are frustrated or challenged. Therefore following Berk's (1986) research

methodology for collecting private speech, the kindergarten children were required to work at an independent school task (Context I) without the teacher's help.

Studies examining individual differences in children's private speech are scarce. The majority of these have addressed hyperactivity (e.g., Goodman, 1977) or aggressiveness (e.g., Stefanek, Ollendick, Baldock, Francis, & Yaeger, 1987). In most studies, children's private speech utterances were observed during either free play or laboratory tasks. Because of this, they lacked an ecologically valid context such as a school setting. In the present study private speech was viewed in two contexts: Context I - spontaneous private speech uttered in a classroom setting during typical, independent, assigned tasks and Context II - induced private speech responses during an analogical reasoning assessment outside of the classroom setting.

The final element of the study was to investigate the presence of corroborating or noncorroborating evidence on social-behavioral measures as a part of the comparison analysis. Instruments used for this were the Nowicki-Strickland Locus of Control (Modified) (Manning, 1988) and the Brown-Hammill Behavior Rating Scale (Brown & Hammill, 1983).

In summary, the general purpose of the study was to examine the differences between the private speech categories used by AR with those used by NAR. Specifically the research questions framing this study were as follows:

1) Do the private speech profiles of three analogical reasoners differ with the profiles of three nonanalogical reasoners?

2) Is it possible to successfully apply Berk's research methodology and categorical scheme (1986) to the collection and coding of private speech utterances of kindergarten children when engaged in independent school tasks (Context I)?

3) How do two different contexts of private speech collection (i.e., naturalistic/spontaneous - Context I and laboratory/induced - Context II) compare?

4) What is the corroborative evidence of social-behavioral measures used to determine if convergence of evidence exists among Context I, Context II, locus of control, and behavior rating?

Method

Subjects

Participants were six children enrolled in a public school kindergarten in the southeastern United States. Three of the children were classified as analogical reasoners based on their superior performance on the Test of Analogical Reasoning in Children or TARC (Alexander, Willson, White, & Fuqua, 1987). The other three children were classified as nonanalogical reasoners based on their poor performance on the TARC. A total of twenty kindergarten children were assessed using the TARC and collections of private speech in two contexts: Context I - spontaneous and Context II - induced. Then the private speech utterances of the top three TARC scorers were compared to the bottom three TARC scorers.

Instruments/Assessments

Analogical Reasoning. As a measure of analogical reasoning performance, the Test of Analogical Reasoning in Children or the TARC was used (Alexander, Willson, et

al., 1987). The TARC is a test of analogy problem solving presented in a game-playing format. The TARC is composed of 16 geometric analogy problems assembled in A:B::C:? array with four options from which the final D term is to be selected. The four options are displayed vertically to the right of the item stem. The first two items of the TARC serve as practice items and are not included in analysis. Two forms of the TARC, the game version, Form A, and the reduced paper version, Form E, were used in this study (see Willson, et al., 1986 for a discussion of the reliability and validity of the TARC versions and forms). Each form used is presented in Figure 1.

Insert Figure 1 about here

The game and reduced paper versions differ in that the game version is a manipulative task. The stem of the analogy problem is constructed of attribute blocks varying on the dimensions of size (large, small), shape (square, rectangle, circle, triangle), and color (red, blue, yellow). The options are four attribute blocks that are laid out vertically to the right of the gameboard. The child solves a given analogy problem by selecting, picking up and placing the desired option block on the gameboard. The size and format of the reduced paper version more closely approximates the types of problems appearing on tests of aptitude or achievement (e.g., Kaufman-Assessment Battery for Children, Raven's Coloured Progressive Matrices). The paper version represents each TARC item on a 4" x 6" card. The child marks his or her selected solution option with either a grease pencil or a game piece.

TARC administration began by telling the children that they were going to be playing a game, and that in this game they must find the option piece that goes with the C term in the same way that the A and B terms go together. The rules of the game were repeated with each new item and credit was given for the selection of the option that correctly solved the analogy problem. All children were individually tested and each testing session lasted 20-25 minutes.

Private Speech, Context I: The classroom teacher collected twenty spontaneous private speech utterances from each subject during a time when the subjects were working independently. The independent task was explained and modeled for the subjects by the teacher. On the days that the teacher collected private speech utterances the students were performing either a written maze activity whereby they drew a path with their pencils from start to finish without crossing over any solid lines, or a cut and paste whereby they had to cut a shape and glue it on top of the same drawn shape, matching edges. In the teacher's estimation these tasks were difficult and demanding for her students. The teacher instructed the students that they were to perform these tasks without her help. As the students began the independent task, the teacher sat behind the target student and said: "I have an important report to finish. I need to sit right here for a few minutes. Please do your work and do not disturb me." The teacher's mere presence was used to maximize the occurrence of private speech. Children display higher incidences of private speech in the presence of individuals (in a more social context) than when left to work alone (in a less social context) (Pellegrini, 1984). The teacher recorded on a note pad the private speech utterances of each of the subjects.

When twenty separate utterances were recorded for a subject, the teacher moved into another subject's space and repeated her original remarks.

Private Speech, Context II: During the administration of the TARC, the teacher (who had received training on both private speech collection and administration of the TARC via a two-hour instructional session using videotaped demonstrations) probed each subject by saying, "What did you say to yourself when you chose this one? or Think aloud as you look at these choices. or What are you saying inside of your head right now? or What did you tell or ask yourself?" The teacher's aide transcribed as the teacher prompted each subject's private speech during the TARC problem solving task.

Nowicki-Strickland Locus of Control (Nowicki & Strickland, 1973) was administered individually, with the items read aloud to subjects. Instead of answering "yes" or "no", subjects pointed to a smiley face if they agreed with the statement and a frowny face if they disagreed. This instrument had acceptable reliability (test-retest reliabilities in the .6 to .7 range). Higher scores (to a maximum of 40) indicate higher externality; lower scores (to a minimum of 0) great internality.

Brown-Hammill Behavior Rating Profile Scale (BRP) (Brown & Hammill, 1983). This instrument was completed by the classroom teacher for each subject. This tapped teacher's perception of the children's classroom behavior. A list of 30 descriptive words and phrases was rated by the teacher as one of the following: very much like the student, like the student, not much like the student, or not at all like the student. Examples of items are as follows: Is verbally aggressive to teachers or peers, Is disrespectful of others' property rights, and Can't seem to concentrate in class. The

numerical range for this measure is a raw score of 0 to 90 and a standard score of 1 to 20.

Coding

Berk's coding scheme (1986) includes three levels and nine mutually exclusive categories. These levels move from Level I: Self-stimulating, task irrelevant private speech to Level II: Task-relevant externalized private speech to the highest level, Level III: Task-relevant external manifestations of inner speech. These levels represent the transformation from private (audible) to inner (inaudible) speech. The goal orientation is the internalization of self-guiding speech. In the current study we were more interested in the goal of task accuracy/task completion - productive school work habits and analogical reasoning using private speech as a cognitive guide. Therefore Berk's Levels I and II were adapted to meet these needs. After studying the private speech utterances of all 20 subjects (400 utterances) certain categories were omitted because these subjects did not use them, and other categories were added. Please see Figure 2 for a complete list of the private speech levels and categories, with examples, drawn from subjects' utterances, provided for each category.

Insert Figure 2 about here

Coding was completed by two University researchers, who were knowledgeable about children's cognitive and metacognitive capabilities. They established an interrater

reliability of .92 percent agreement. To establish interrater reliability, each researcher coded the same 25 private speech utterances and percent agreement was calculated.

Results

The spontaneous private speech utterances emitted in the classroom setting during an independent task (Context I) are reported in Table 1.

Insert Table 1 about here

The four levels are as follows: Level I - Task Irrelevant (expressing, commenting, and questioning); Level II - Task Relevant - Unhelpful (giving up, questioning); Level III - Task Relevant - Helpful (focusing, describing, questioning, directing); Level IV - Task Relevant - Helpful (correcting, coping, reinforcing, solving). The combined frequencies for the three analogical reasoners and three nonanalogical reasoners are seen in Table 1 for each private speech category. The percentages of each private speech category by group are reported as follows: AR - Level I 1%, Level II 2%, Level III 27%, Level IV 70% and NAR - Level I 15%, Level II 25%, Level III, 45%, Level IV 15%. It is clear that the three analogical reasoners did not talk to themselves in the same way that the three nonanalogical reasoners talked to themselves. The composition of their private speech profiles was quite different.

In Table 2 the frequencies of induced private speech utterances by group and relation (Context II) are presented. Again the analogical reasoners provided a different

profile of private speech utterances than did the nonanalogical reasoners: AR = 36 higher order, 6 other, and 0 lower order remarks; NAR = 10 higher order, 13 other, and 19 lower order references. Please refer to Table 2 for the specific relations present in the induced private speech context (i.e., when the teacher said, "What did you say to yourself when you chose this one?" and etc.).

Insert Table 2 about here

A summary of scores collected from each of the AR and NAR are found in Table 3. The TARC scores, the average percentages for private speech utterances (Context I), frequencies of private speech utterances (Context II), the Nowicki-Strickland Locus of Control scores and the results of the Brown-Hammill Behavior Rating Scale are reported in Table 3 by subject/group. When viewing these data in Table 3, it is clear that the differences between AR and NAR are in a similar direction for each of the measures. The multiple convergence of results revealed the AR used higher levels of private speech spontaneously and when induced; they exhibited more internal loci of control orientations; and their teacher rated their social behavior more favorably when compared to NAR.

Insert Table 3 about here

Discussion

The first question of this study was framed to examine and compare the private speech profiles of three AR with three NAR. If we view analogical reasoning as a measure of intellectual functioning, these findings support a number of studies that indicate that brighter children are more advanced in private speech development than average children (Berk, 1986; Berner, 1971; Kohlberg, et al., 1968). This advancement relates to Berk's (1986) conceptualization of development from Level I to Level III (toward internalization of speech). Our results lend support for the idea that cognitively advanced children use private speech utterances that are more task facilitative.

The second question of the study was to investigate Berk's research methodology and categorical scheme (1986) for the collection and coding of private speech utterances of kindergarten children in Context I. Some of Berk's methodology was used for the collection procedures (e.g., no coding was done when the child asked the teacher for help; the child was performing a challenging problem-solving type task that required him/her to work independently). These procedures, in addition to others described previously, were easy to implement by the kindergarten teacher. Based on the teacher's reaction, it seems plausible that other teachers could be trained to reliably collect private speech utterances in their own classrooms. In this way, teachers could gain additional insights into how their students learn. The problem solving process itself would become more obvious to teachers.

The orientation of Berk's coding scheme was changed slightly in this study from internalization of private speech to problem solution using private speech. The interest

was not so much in internalization of speech-to-self as it was in how children used their speech-to-self to facilitate problem solving.

The third question of the study was framed in an effort to compare two different contexts of private speech collection (Context I versus Context II). A limitation of the study was that the utterances were coded differently for each context. However, the general pattern and direction of the findings were similar for both Contexts. Regardless of whether the private speech was being induced (Context II) or used spontaneously (Context I) the AR used a higher level of private speech functioning. This finding points to the pervasiveness and reliability of private speech usage for individual students regardless of setting.

The final question addressed the investigation of the corroborative evidence of social-behavioral measures, since private speech retains some social overtones. Locus of control results and social/behavioral ratings continued the established pattern of higher levels of functioning among AR. The AR were more internally oriented and were rated higher on a behavioral scale by their classroom teacher. Therefore a convergence of evidence exists among private speech advancement, locus of control, and behavior rating for the six children in this study.

In conclusion Bivens and Berk (1989) claim that "... it was Vygotsky's belief that the larger course of development should be mirrored on a more immediate, microgenetic level -- that of the individual child working through a particular task ... on the level of mastery of a single task or skill, relations between private speech and performance should be strong(er) (p. 18)." The current study represented an attempt to investigate and

provide some insights into the connections between private speech problem-solving (a metacognitive skill) and analogical reasoning (a cognitive skill). These connections were present and persistent across tasks, contexts, and social/behavioral ratings. In addition, these findings provide information which can be used to further evaluate and study alternative methods to examine young children's cognitive and metacognitive abilities.

References

Alexander, P. A., White, C. S., & Mangano, N. (1983). Examining the effects of direct instruction in analogical reasoning on reading comprehension. In J. A. Niles & L. A. Harris (Eds.), Searching for meaning in reading/language arts processing and instruction (pp. 36-41). Rochester, NY: National Reading Conference.

Alexander, P. A., Willson, V. L., White, C. S., & Fuqua, J. D. (1987). Analogical reasoning in young children. Journal of Educational Psychology, 79, 401-408.

Alexander, P. A., Willson, V. L., White, C. S., Fuqua, J. D., Clark, G. D., Wilson, A. F., & Kulikowich, J. M. (1989). The development of analogical reasoning in four- and five-year-old children. Cognitive Development, 4, 65-88.

Alexander, P. A., Wilson, A. F., White, C. S., Willson, V. L., Tallent, M. K., & Shutes, R. E. (1987). Effects of teacher training on children's analogical reasoning performance. Teaching and Teacher Education, 3, 275-285.

Berk, L. E. (1986). Relationship of elementary school children's private speech to behavioral accompaniment to task, attention, and task performance. Developmental Psychology, 22, 671-680.

Bivens, J. A., & Berk, L. E. (1989). A longitudinal study of the development of elementary school children's private speech. Paper presented to the Biennial Meeting of the Society for Research in Child Development, Kansas City.

Brown, A. L., Kane, M. J., & Echols, C. H. (1986). Young children's mental models determine analogical transfer across problems with a common goal structure. Cognitive Development, 1, 103-121.

Brown, L., & Hammill, D. (1983). Behavior Rating Profile: An ecological approach to behavioral assessment. Austin, TX: PRO ED.

Crisafi, M. A., & Brown, A. L. (1986). Analogical transfer in very young children: Combining two separately learner solution to reach a goal. Child Development, 57, 953-968.

Davidson, R. E. (1976). The role of metaphor and analogy in learning. In J. R. Levin & V. L. Allen (Eds.), Cognitive learning in children: Theories and strategies (pp. 135-162). New York: Academic.

Dickie, J. R. (1973). Private speech: The effect of presence of others, task, and intrapersonal variables. Dissertation Abstracts International, 34, 1292B. (University Microfilms No. 73-20, 329)

Frauenglass, M. H., & Diaz, R. M. (1985). Self-regulatory functions of children's private speech: A critical analysis of recent challenges to Vygotsky's theory. Developmental Psychology, 21, 357-364.

Goodman, S. (1977). A sequential functional analysis of preschool children's private speech. Paper presented at the meeting of the Society for Research in Child Development, New Orleans.

Goodman, S. (1981). The integration of verbal and motor behavior in preschool children. Child Development, 52, 280-289.

Holyoak, K. J., & Junn, E. N., & Billman, D. O. (1984). Development of analogical problem-solving skill. Child Development, 55, 2042-2055.

Kohlberg, L., Yaeger, J., & Hjertholm, E. (1968). Private speech: Four studies and a review of theories. Child Development, 39, 691-736.

Manning, B. H. (1988). Application of cognitive behavior modification: First and third graders' self-management of classroom behaviors. American Educational Research Journal, 25(2), 193-212.

Manning, B. H. (in press). Applying Meichenbaum's cognitive behavior modification to regular education students exhibiting inappropriate classroom conduct. International Journal of Ecology, 4(1).

Mulholland, T. M., Pellegrino, J. W., & Glaser, R. (1980). Components of geometric analogy solution. Cognitive Psychology, 12, 252-284.

Nowicki, S., & Strickland, B. (1973). A locus of control scale for children. Journal of Consulting and Clinical Psychology, 40, 148-154.

Pellegrini, A. D. (1984). The development of the functions of private speech: A review of the Piaget-Vygotsky debate. In A. Pellegrini and T. Yawkey (Eds.), The development of oral and written language in social contexts. Norwood, NJ: Ablex.

Stefanek, M. E., & Ollendick, T. H., & Baldock, W. P., Francis, G., & Yaeger, N. J. (1987). Self-statements in aggressive, withdrawn, and popular children. Cognitive Therapy and Research, 11(2), 229-239.

Sternberg, R. J. (1977). Intelligence, information processing, and analogical reasoning: The componential analysis of human abilities. Hillsdale, NJ: Erlbaum.

Sternberg, R. J., Ketron, J. L., & Powell, J. S. (1982). Componential approaches to the training of intellectual performance. In D. K. Detterman, & R. J. Sternberg (Eds.),

How and how much can intelligence be increased? (pp. 155-172). Norwood, NJ: Ablex.

Sternberg, R. J., & Rifkin, B. (1979). The development of analogical reasoning processes. Journal of Experimental Child Psychology, 27, 192-232.

Vygotsky, L. S. (1978). Mind in society. Cambridge, MA: Harvard University Press. (Original work published 1930, 1933, and 1935)

Vygotsky, L. S. (1987). Thinking and speech. In The collected works of L. S. Vygotsky: Vol. 1 Problems of general psychology. (N. Minick, Trans.). NY: Plenum. (Original works published in 1934)

White, C. S., & Alexander, P. A. (1986). Examining the effects of direct instruction on four-year olds' ability to solve geometric analogy problems. Cognition and Instruction, 3, 261-268.

White, C. S., & Caropreso, E. J. (1988, January). Training in analogical reasoning processes: Effects on low-socioeconomic status preschool children. Paper presented at the Southwest Educational Research Association, San Antonio.

Willson, V. L., Alexander, P. A., White, C. S., Fuqua, J. D., Clark, G. D., & Wilson, A. F. (1986, April). Form and presentation variation in a test of geometric analogies. Paper presented to the American Educational Research Association, San Francisco.

Zivin, G. L. (1972). Functions of private speech during problem-solving in preschool children. Dissertation Abstracts International, 33, 1834B. (University Microfilm No. 72-26, 224)

Table 1

Task Relevant and Task Irrelevant Private Speech Profiles by Group and Private Speech Categories (Context I)

Categories			Group AR n = 3 Total Responses (TR) = 20 f	%	Group NAR n = 3 TR = 20 f	%
Task Irrelevant						
1)	Expressing		.33	.01	2.33	.12
2)	Commenting/Imaginary Others	Level I	---	---	.33	.02
3)	Questioning		---	---	.33	.02
Total Level I			.33	.01	3.00	.15
Task Relevant (Unhelpful)						
4)	Giving Up	Level II	.33	.02	4.67	.23
5)	Questioning		---	---	.33	.02
Total Level II			.33	.02	5.00	.25
Task Relevant (Helpful)						
6)	Focusing	Level III	.33	.02	.33	.02
7)	Describing		2.00	.10	4.33	.22
8)	Questioning		1.67	.08	.66	.03
9)	Directing		1.33	.07	3.67	.18
Total Level III			5.33	.27	9.00	.45
10)	Correcting	Level IV	2.67	.13	----	---
11)	Coping		.66	.03	.33	.02
12)	Reinforcing		2.33	.12	1.33	.07
13)	Solving		8.33	.42	1.33	.07
Total Level IV			14.00	.70	3.00	.15

Note. AR = analogical reasoner, NAR = nonanalogical reasoner

Table 2

Frequencies and Percentages of Induced Private Speech Utterances by Group and Relation (Context II)

Relation	Group AR n = 3 Total Responses = 42 f	Group NAR n = 3 Total Responses = 42 f
Lower order		
Total		
Color		6
Shape		11
Size		
Color and shape		2
Color and size		
Shape and size		
Color and shape and size		
Higher order		
Total		
Pairing 2 and 4		
Pairing 1 and 4	1	1
Pairing 1 and 3		
Pairing 2 and 3	4	2
Multiple pairings (1,2,3, & 4)	31	7
Other	6	13
Don't know		
Totals =	36 higher order 6 other 0 lower order	10 higher order 13 other 19 lower order

Note. AR = analogical reasoner, NAR = nonanalogical reasoner

Table 3

Summary of Three AR versus Three NARs' Scores on Cognitive (TARC) Metacognitive (Context I and II), Locus of Control, and Social/Behavioral Ratings

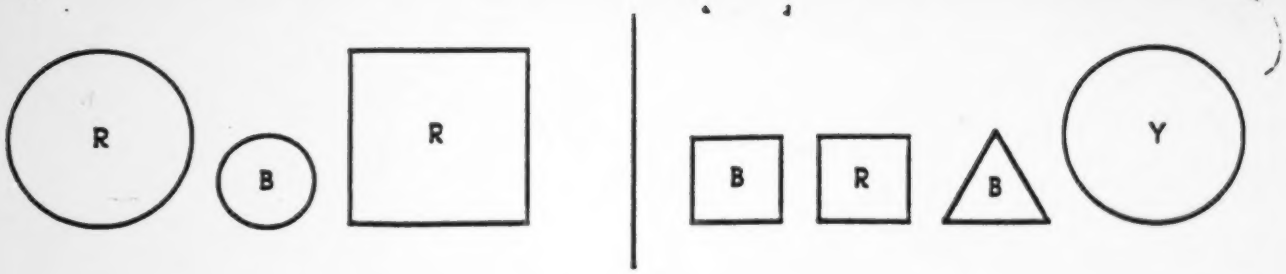
Subject/Group[a]	TARC	Private Speech Context I[b]		Private Speech Context II[c]		Locus of Control[d]	Social/Behavioral Ratings[e]
Aaron (AR)	13	Level I	1%	Higher Order	36	13	11
Beth (AR)	12	Level II	2%	Other	6	13	12
Carl (AR)	11	Level III	27%	Lower Order	0	7	12
		Level IV	70%				
Dale (NAR)	5	Level I	15%	Higher Order	10	19	6
Erin (NAR)	3	Level II	25%	Other	13	15	6
Faye (NAR)	2	Level III	45%	Lower Order	19	24	7
		Level IV	15%				

a Fictitious names are used.
b Average percentages for all three subjects in each group (AR vs NAR) are reported.
c Totals for all three subjects in each group (AR vs NAR) are reported.
d Lower scores indicate greater internality.
e Reported as Standard Scores.

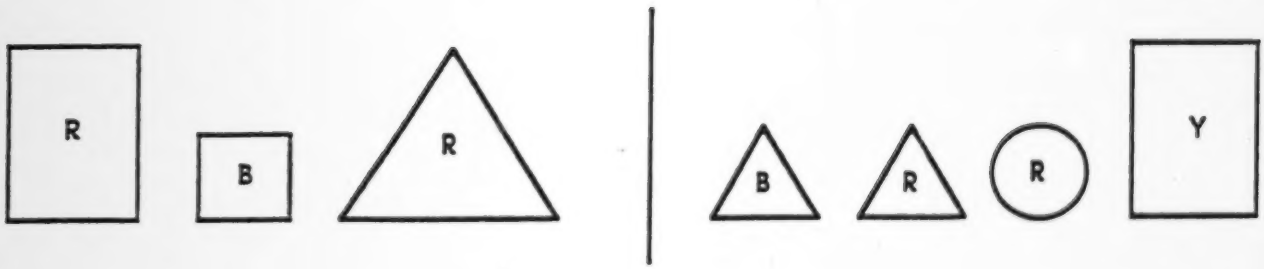
Figure Captions

Figure 1. Sample items from the TARC

Figure 2. Private speech profiles of kindergarten children during independent school tasks



Item 4, Form A



Item 4, Form E

Figure 2

Private Speech Profiles of Kindergarten Children During Independent School Tasks

Task Irrelevant			Examples of Categories	
1)	Expressing		1)	Ohhh-my hand hurts
2)	Commenting (Imaginary others)	LEVEL I	2)	Batman! Batman!
3)	Questioning		3)	I see John over there, don't I?
Task Relevant (Unhelpful)				
4)	Giving Up	LEVEL II	4)	I can't figure this out.
5)	Questioning		5)	Why do I have to do this?
Task Relevant (Helpful)				
6)	Focusing		6)	Look at my page.
7)	Describing	LEVEL III	7)	I'm making them blue lines.
8)	Questioning		8)	Does this go here or here?
9)	Directing		9)	Now, time to erase.
10)	Correcting		10)	No, not this way. The other way! other way!
11)	Coping	LEVEL IV	11)	It's okay. I messed up. It's okay.
12)	Reinforcing		12)	Yay! I cut it just right!
13)	Solving		13)	1-2-3-4-5-6-7-8-9-10. I have 10.